

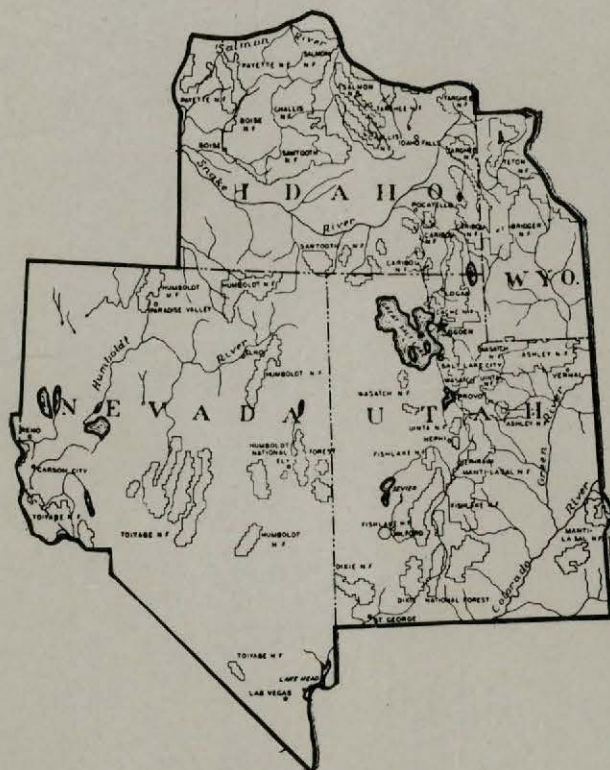
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MOUNTAIN PINE BEETLE CONDITIONS

FOREST SERVICE REGION 4

November 1962

R. I. WASHBURN and M. D. MCGREGOR
Entomologists



BRANCH OF FOREST INSECT AND DISEASE
PREVENTION AND CONTROL

DIVISION OF TIMBER MANAGEMENT

Forest Service
U. S. Department of Agriculture
Ogden, Utah

MOUNTAIN PINE BEETLE CONDITIONS IN LODGEPOLE PINE FORESTS OF
FOREST SERVICE REGION 4

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INTRODUCTION

This report presents current information on infestations of the mountain pine beetle (Dendroctonus monticolae Hopk.) in lodgepole pine stands on lands of all ownerships in the territory covered by the U. S. Forest Service, Region Four. The Intermountain Region (Four) territory encompasses all of the states of Utah, Nevada, the western half of Wyoming, and all of southern Idaho.

The mountain pine beetle continues to be active throughout the lodgepole pine belt of the Region. A few outbreaks also occur in second-growth and mature ponderosa pine. There are presently over forty epidemic infestations varying in size from a few acres to over 160,000 acres. In addition, many small groups of infested trees are noticeable outside of epidemic areas. A large majority of the infestations show increasing tendencies but a few centers are classed as static or decreasing.

Biological evaluations of the mountain pine beetle were complicated by late emergence and attack periods which extended through the month of September. A resumption of egg laying is expected next spring in some areas.

To obtain the data necessary to assess the present situation and predict the course of the outbreaks, as many as four examinations are made per generation. These data are used to construct simple life tables showing population levels for each examination and changes in density between examinations. It is recognized that single life tables cannot be used to predict trends. However, an accumulation of this type of data produces useful leads for predicting the future course of outbreaks.

Because of the large number and severity of insect problems in the Region, it was not possible to obtain the data desired from all mountain pine beetle infestations. Consequently, it was necessary to depend on judgment for interpretations of some infestations.

A discussion of the various infestation centers follows. Maps showing the location of the centers follow the discussion of the infestations for each Forest area.

CURRENT CONDITIONS

Wasatch National Forest

A control project on the Wasatch National Forest known as the "North Slope Project" has been in operation since 1958. To date over 400,000 infested trees have been treated. Treatment has included application of toxic chemicals, felling and burning, burning standing trees, and logging.

An explosive buildup of mountain pine beetle occurred in 1961. Buildup ratios on the North Slope averaged about ten newly infested trees to one tree killed. Fall 1961 operational survey crews estimated 250,000 trees were infested. Nearly 200,000 of these were treated in fall and spring control work.

Brood densities in the fall of 1961 averaged 271.5 per square foot of bark area. During the winter of 1961-62, reports were received of unusually cold temperatures within the project area. With the chances favorable for some winter brood mortality, several winter examinations were made to record and measure this factor. While the figures varied, the overall picture indicated that brood killed during the early to mid-winter period was not unusual. By late spring, however, it became evident that considerable late winter and early spring mortality had occurred in a rather spotty pattern over sizeable areas, notably on the southern end of the infestation at the higher elevations. In no areas were all the beetles killed, nor were there any areas with sufficient mortality to warrant discontinuation of control efforts.

Overall figures showed that brood mortality averaged 22.2 percent per square foot before December 1961. Mortality throughout the winter averaged 73.4 percent. Brood was reduced from fall brood density of 271.5 to an April surviving population of 72.4 per square foot of bark area.

In spite of this marked reduction in the population from natural causes, and the treatment of nearly 200,000 trees, the 1962 operational surveys show 80,000 newly infested trees on 125,000 acres. In addition, it is estimated that there are over 30,000 infested trees within areas not covered by the survey. These areas include lands managed by the Bureau of Land Management, most of the state and private lands within the infestation boundaries, and National Forest areas where contract treating is now under way. On the entire area, therefore, less than 50,000 trees attacked in 1961 were left untreated. There are now over 100,000 infested trees indicating a 2 : 1 buildup ratio. Thus, it is obvious that while there has been a substantial reduction in the number of infested trees and the bark beetle population, strong epidemic tendencies still persist.

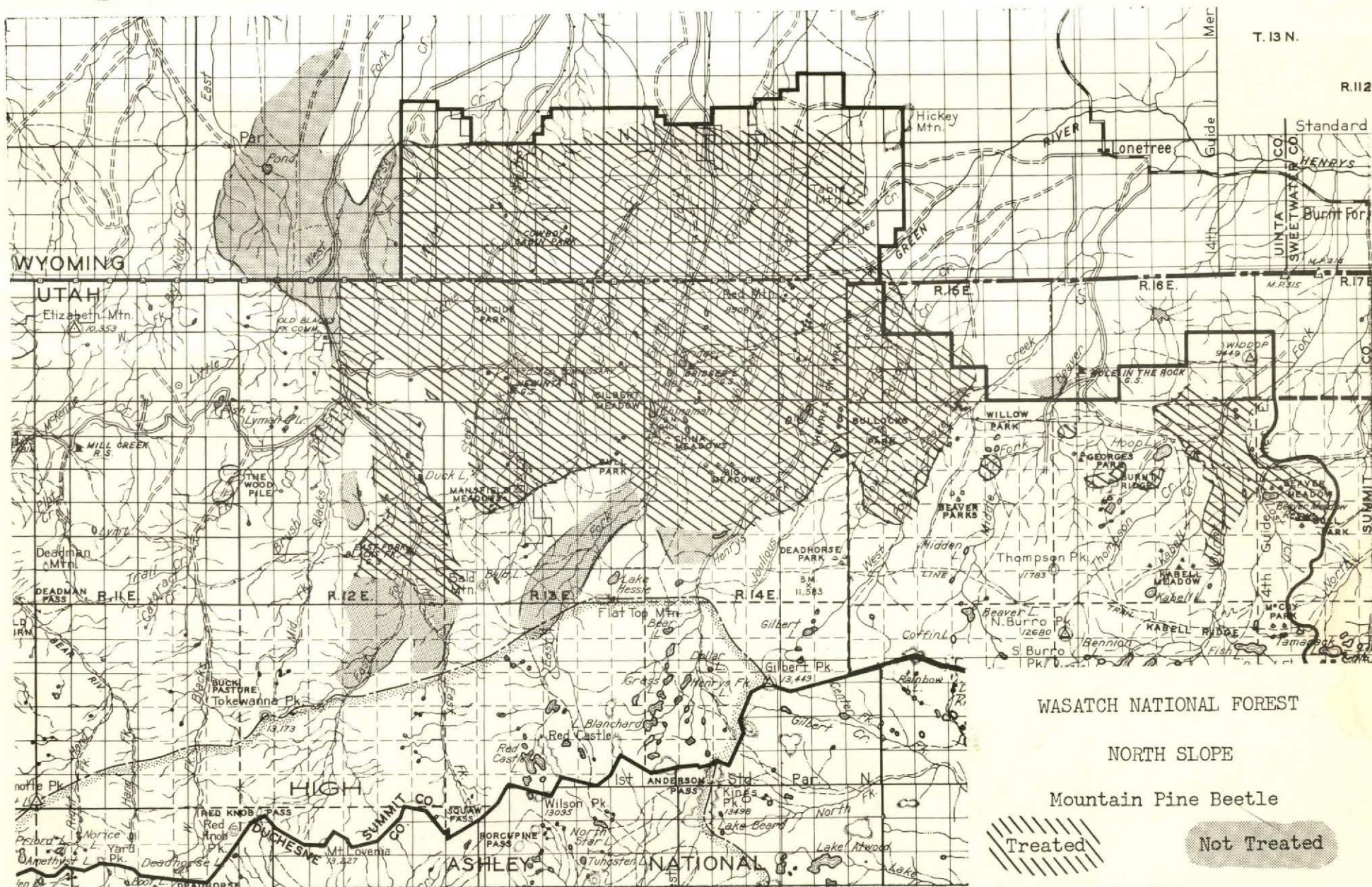
1962 attack densities average 9.9 per square foot, lighter than last year but comparable to the 1960 average which produced a 10 : 1 buildup.

Fall brood densities average 148.7 per square foot. Since many of the attacks occurred late, it is quite possible the females may resume egg laying next spring.

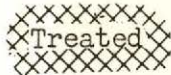
Aerial detection surveys show approximately 8,000 lodgepole pine killed last year in the Stillwater drainage. Nearly all of those trees were treated; nevertheless, some newly attacked trees can be found throughout the treated areas. Fall 1962 evaluations show an average of 12.1 beetle attacks per square foot of bark surface with a brood density of 159.4 per square foot, and the trend is still epidemic and increasing.

In the main Bear River drainage, aerial detection surveys estimate 20,000 lodgepole pine "faders". Large groups of newly attacked trees are numerous. Fall brood density is heavy and broods appear healthy. This area is outside the main infestation on private land where no interest in cooperative treating has been developed. The trend is epidemic with increasing tendencies, but the spread appears to be westward away from National Forest land toward noncommercial stands.

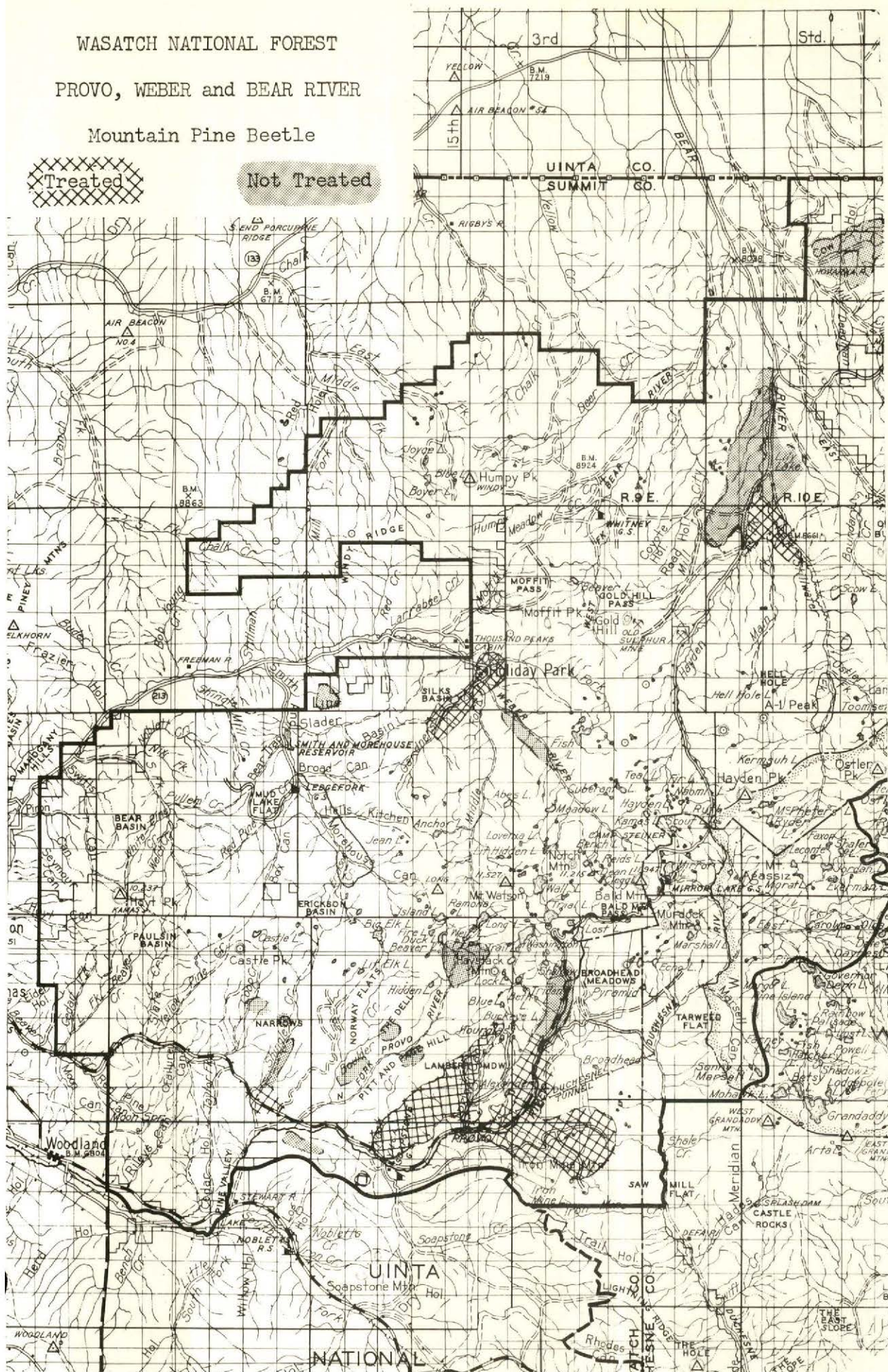
On the Provo River project on the Kamas District, 22,935 lodgepole pine were treated out of an estimated 30,000 infested trees in the Provo and Weber River drainages. Epidemic centers are still noticeable within the control boundaries. Brood densities average 206.7 per square foot. Operational surveys estimate 20,000 newly attacked trees in the Provo River drainage. The buildup ratio is nearly 3 : 1 and the infestation is classed as epidemic and increasing.



WASATCH NATIONAL FOREST
 PROVO, WEBER and BEAR RIVER
 Mountain Pine Beetle



Not Treated



Ashley National Forest

Epidemic centers of mountain pine beetle have been present on the Ashley National Forest since 1956. Other areas contain groups of infested trees, but buildup ratios and brood densities in these areas are not indicative of epidemic conditions.

North Slope

On the Manila District, epidemic centers of mountain pine beetle in the lodgepole and ponderosa pine stands extend from Beaver Meadows on the west to Cart Creek on the east.

Operational surveys show approximately 3,000 infested lodgepole pine trees in areas where nearly ten times that number were treated this spring. From Carter Creek to Cart Creek nearly 3,000 lodgepole are infested. Within this area, in Allen and Eagle Creeks, the number of infested trees has increased over last year. Fall brood densities average 163.8 per square foot. These densities are lower than normally found in epidemic situations but at the time of the investigation, beetles were still laying eggs, and some further brood increase is expected.

South Slope

In Dry Creek, there are approximately 200 to 300 lodgepole pine "faders" on about 600 acres. Large-diameter trees are being attacked, and brood densities average 290.4 per square foot. About 45 percent of the infested stand is comprised of mature and overmature trees. The infestation can be expected to persist and expand if the present rate of activity continues.

About ten small groups of lodgepole pine averaging ten trees per group were killed by mountain pine beetle in Swift Creek last year. Biological evaluations this fall show an average brood density of 147.2 per square foot. Conditions vary from endemic to static.

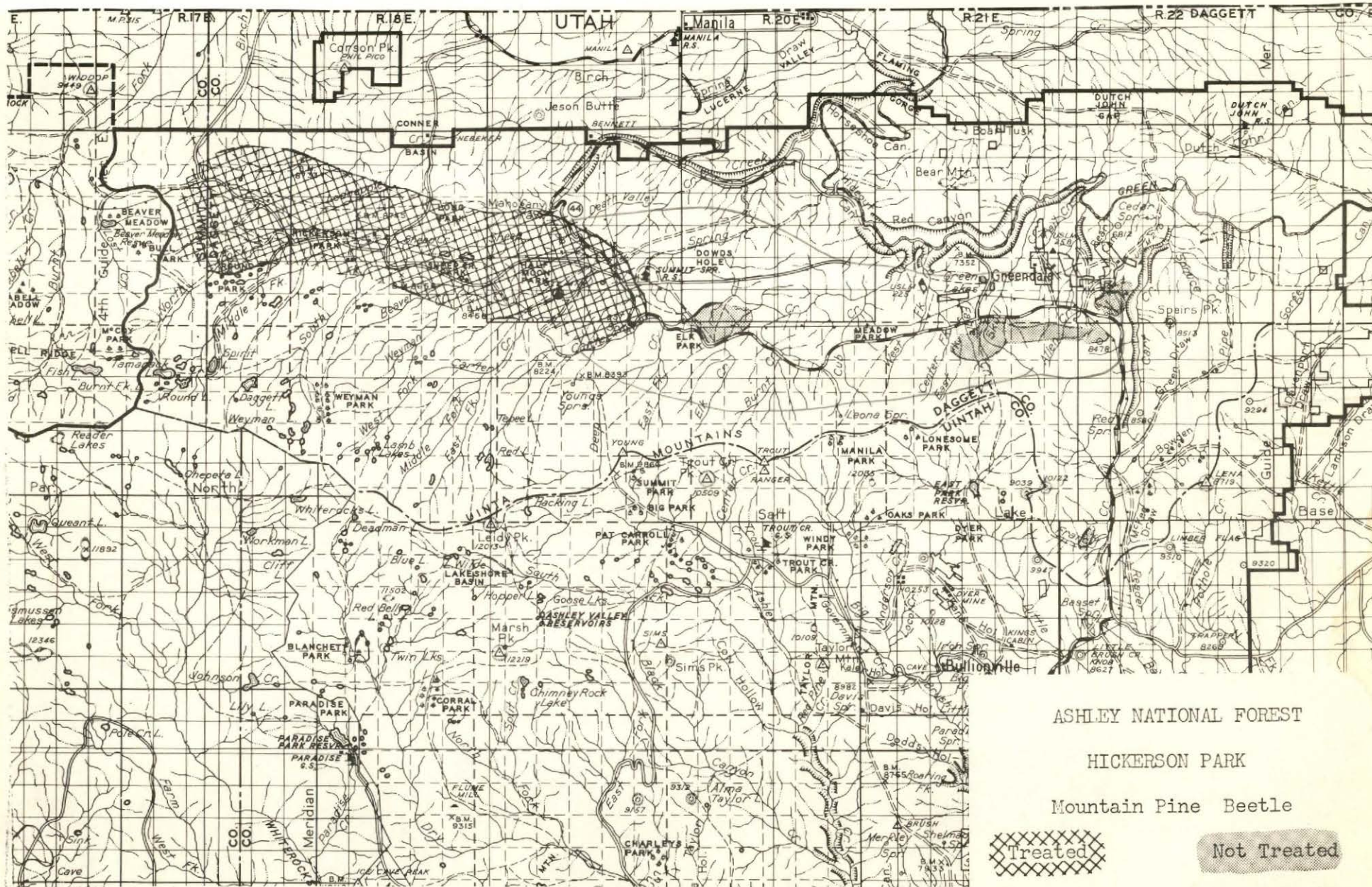
Operational surveys in Cow Canyon show a decrease in the number of infested trees from last year and this infestation is classed as static or endemic. Aerial detection surveys showed no increase in the number of "red tops" from 1961 to 1962. This area will be watched to detect any change in status.

The boundaries of the mountain pine beetle infestation in Oweep Creek, or the Lake Fork, in the High Uinta Wilderness Area extended into Ottoson Basin this year. Lodgepole pine "faders" occur in groups of 50 to 200 trees per group. This is, by far, the largest mountain pine beetle infestation on the Ashley National Forest and the trend is still increasing.

In the Granddaddy Basin and extending down Rock Creek, there is a noticeable increase in the number of faded lodgepole pine. A single group of twenty to thirty trees lie between Betsy and Fern Lakes. Two to three miles northeast of Granddaddy Lakes is another "hot spot" of mountain pine beetle activity. Faded trees occur in groups of two or three trees per group from Doc Lake to Granddaddy Lakes. While the number of infested trees has increased, no major trend toward epidemic conditions is apparent. This area, also, should be watched for any change in the situation.

In Miners Gulch, north of the old Miners Gulch infestation, there is a new infestation of mountain pine beetle covering approximately 300 acres. All new attacks are in mature and overmature lodgepole. Brood densities average 163.0 per square foot. This infestation is adjacent to a stand of mixed lodgepole and ponderosa pine and is likely to spread into it.

The mountain pine beetle infestation in the East Fork of Farm Creek, southwest of Rock Creek, is still active. Aerial detection surveys show 1,000 lodgepole pine were killed in 1961, and fall 1962 operational surveys found 1,000 newly attacked lodgepole pine for a 1 : 1 ratio. This is an island of timber, and from all indications the infestation does not present any particular threat to adjacent lodgepole pine stands.



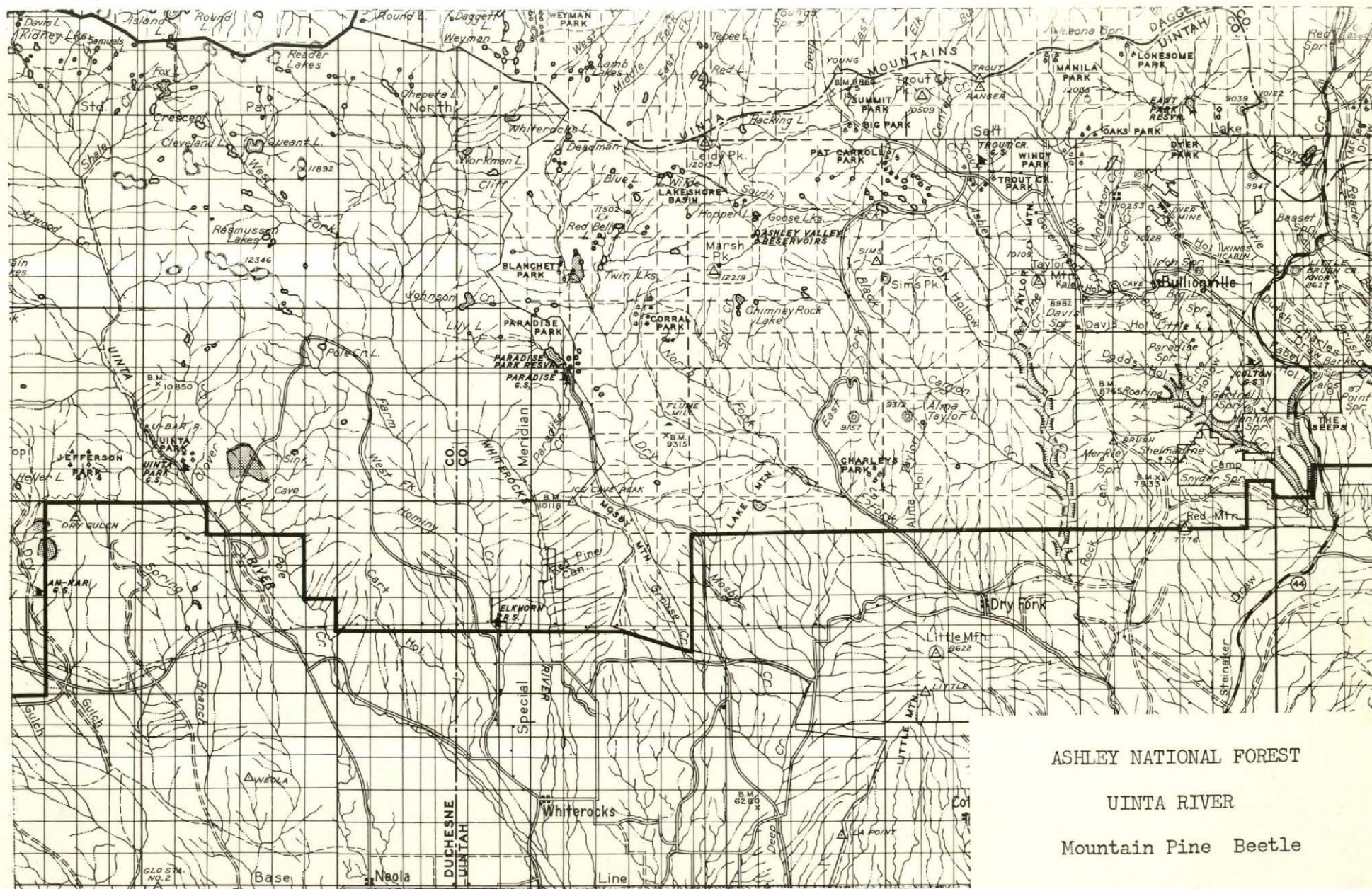
ASHLEY NATIONAL FOREST

HICKERSON PARK

Mountain Pine Beetle

Treated

Not Treated



ASHLEY NATIONAL FOREST

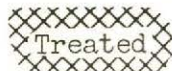
UINTA RIVER

Mountain Pine Beetle

ASHLEY NATIONAL FOREST

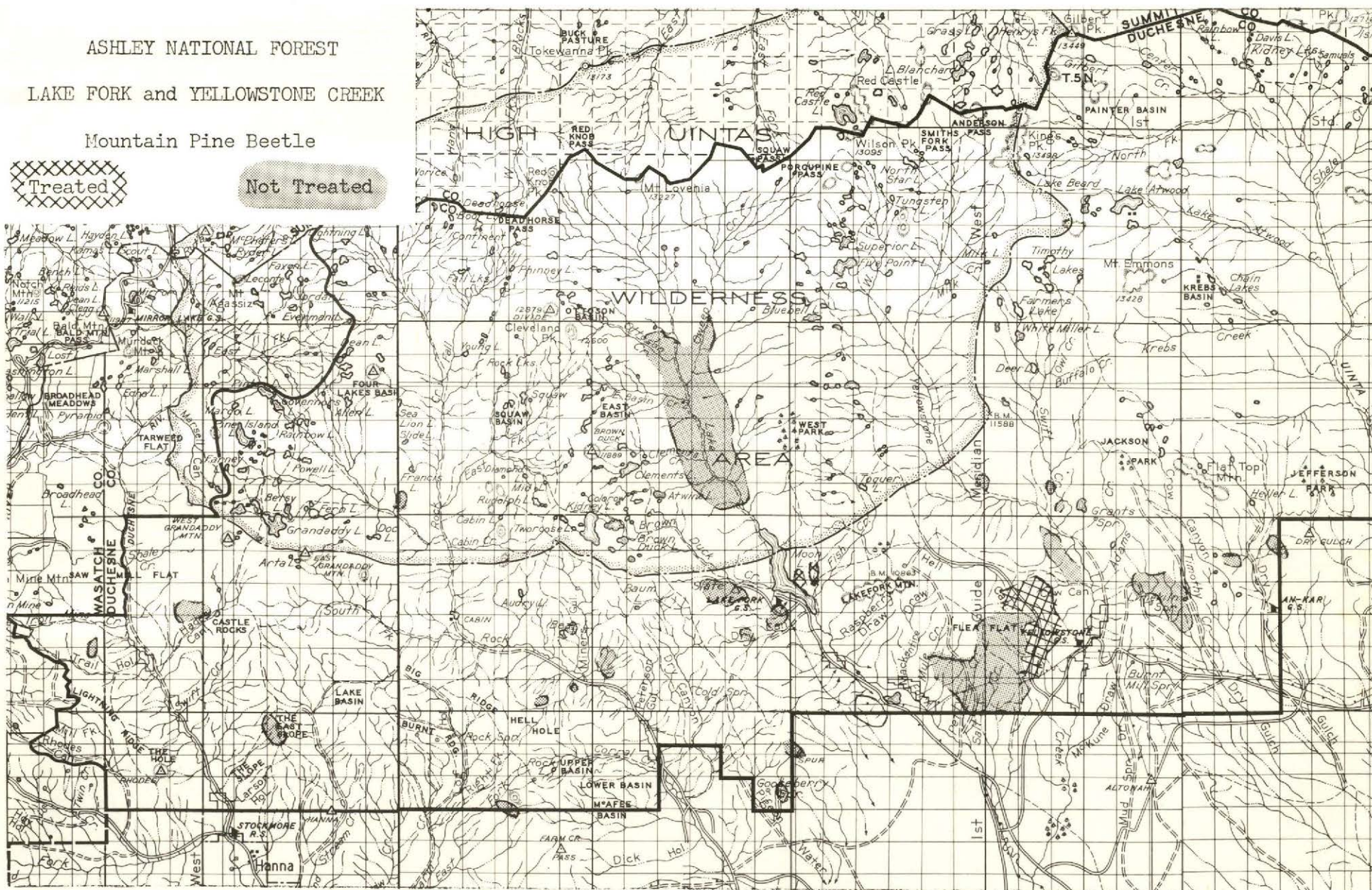
LAKE FORK and YELLOWSTONE CREEK

Mountain Pine Beetle



Treated

Not Treated



Grand Teton National Park

Last fall, there were approximately 15,000 mountain pine beetle infested trees in the lodgepole pine stands on Grand Teton National Park. Operational surveys, recently completed, show more than 44,000 trees currently infested with mountain pine beetle. Control efforts on the Park this year were restricted by lack of funds; less than 2,000 infested trees were treated. The 3 : 1 increase ratio is indicative of severe epidemic conditions.

To better understand the biotic potential of this epidemic situation, comparisons of beetle densities for the last three years were made on two areas. One area was Signal Mountain, where the infestation developed in 1955 and has been treated repeatedly. The other area, Pilgrim Mountain, was first determined to be epidemic in 1960 and was treated in 1961.

Comparative Brood Density Measurements of Two Areas on Grand Teton Natl. Park

	Fall 1960	Spring 1961	Percent Brood Reduction	Fall 1961	Spring 1962	Percent Brood Reduction	Fall 1962
Pilgrim Mtn.	316.8	229	27.8	249	190	23.8	344.9
Signal Mtn.	204.4	No sample		139.2	73	47.5	201.2

The new infestation (Pilgrim Mountain) has had consistently higher brood densities than Signal Mountain. On both areas brood mortality through the winter has been substantially lower than generally experienced elsewhere in the Region. Each year, since 1960, the number of infested trees has increased. Spring brood densities, as low as 73, have resulted in increases in the number of infested trees. Winter brood mortality on either area must exceed 50 percent if the brood population next spring is to be lower than it was this year. On Pilgrim Mountain, overall mortality, from fall to new attack, will have to exceed 92.2 percent before a reduction in the number of attacking adults can be expected. An overall mortality through the attacking adults of 89.9 percent will sustain the present population levels on Signal Mountain.

The above statements presume that the sex ratios of the emerging adult population will be equal; also, that the fecundity rate will be similar to past years.

In the light of this biological data, and assuming conditions continue similar to the last three years, approximately 130,000 trees will be attacked in the fall of 1963. If the trend extends for two more years, and the brood is not reduced by treatment, probably 400,000 trees will be attacked in 1964. At present, there are no biological data to indicate the epidemic will start downward in the near future. Climatic

conditions can, of course, change this, but the present high population levels can withstand mortalities around 90 percent before population levels are reduced, so the odds are against a trend reversal.

Teton National Forest

Lodgepole pine stands on and adjacent to the Teton National Forest have been infested with mountain pine beetle since 1956. Aerial detection surveys, this fall, located several new infestation centers as well as extensions of old centers. During 1962, over 50,000 infested trees were chemically treated. Operational surveys, this fall, estimate 90,000 newly infested trees within the infestation boundaries. The number of infested trees decreased in some treated units, but increased in others, in spite of treatment this year. The surveys show considerable spread in extensions of old centers and new infestations. Infestations on the Teton National Forest are discussed in two parts, North Teton and South Teton.

North Teton

All of the Teton National Forest, north of Jackson, Wyoming, is considered as North Teton in this report.

The following biological data were collected in control areas:

Brood densities in the fall of 1961 averaged 280.0 per square foot in the older epidemic areas. Brood mortality over the winter varied from 46 to 60 percent. The surviving spring population averaged 140.0 per square foot of infested bark. Two areas of relatively new infestation had average 1961 fall brood densities of only 141.0 per square foot. Mortality during winter months ranged from 8 to 25 percent with the surviving spring population averaging 135 per square foot in these areas. Although fall brood densities and winter mortality varied, average spring larval and pupal densities were not appreciably different throughout the Teton National Forest. Spring brood densities were sufficient to cause an increased number of trees to be attacked in 1962. Attack densities equalled or exceeded those recorded last year. Fall brood densities collected in 1962 on the Teton National Forest average 198.2 per square foot of infested bark.

Fall Biological Data from North Teton Units

Units	DBH	Brood per sq. ft.	Gallery starts	Gallery inches	Trend
Spread Creek	14.6	121.6	16.4	84.2	Increasing
Buffalo River	16.0	165.6	8.0	55.4	Increasing
Antelope Mountain	12.8	207.2	10.2	82.6	Increasing
Pacific Creek	12.4	298.4	9.8	116.0	Increasing

The Buffalo River infestation includes the Rosies Ridge, Hatchet Motel, and Black Rock Ranger Station control units. In some of the treated units, there are now fewer trees than last year; but the area of infestation has enlarged. On Rosies Ridge, 3.4 more beetles emerged per square foot than parent adults which had attacked the trees. Fall brood densities average 165.6 per square foot, but parent adults had not completed egg laying and gallery construction at the time of the counts; therefore, the above figure represents only a minimum fall brood density. The persistent epidemic trend will likely continue for one or more years.

Aerial detection surveys show 300 faded lodgepole pine adjacent to the Rosies Ridge control unit on the south-facing slopes of Mt. Randolph. Last year, there were approximately 100 faded trees in groups of twos and threes in this infested area. Indications are that a rise in population in this area is paralleling that in adjacent units.

On the ridge east of Ditch Creek, adjacent to the main Ditch Creek infestation, aerial detection surveys show 1,500 lodgepole pine "faders", a 7 : 1 buildup over last year's count. Although ground evaluations have not been completed, the increasing trend seems likely to continue.

In the Gros Ventre drainage, south of the main Antelope Mountain infestation, several small spots of mountain pine beetle activity were detected by aerial surveys. No ground checking was possible this fall, but the area is close to epidemic infestations and the trend can be assumed to be increasing. These areas will be examined early next spring.

South Teton

Aerial survey crews this year estimated over 30,000 new attacks on approximately 6,500 acres in the Hoback River drainage and its tributaries. Operational surveys increased the figure to more than 35,000 newly attacked trees. Beetle populations have been increasing since 1960. Grouping tendencies appear most pronounced in areas where the trees are of large diameter. Some small, spot infestations have not increased significantly while others have developed epidemic trends in one or two years and threaten to spread to adjacent stands.

An increase of mountain pine beetle activity in Jack Creek, in the Hoback drainage, has been noticeable since 1960. Over 4,500 trees were infested in 1961. Fall operational surveys estimate 11,500 trees are now infested. Approximately 40 to 50 percent of this lodgepole pine stand is mature host material. Epidemic tendencies persist.

Aerial surveys have shown increases of mountain pine beetle activity since 1961 in Willow Creek, a drainage of the Hoback River. At the confluence of Willow, Fullturn, and Halfturn Creeks, there were approximately 100 lodgepole pine "faders" in 1961. Detection surveys in 1962

show 250 lodgepole pine "faders" in this same area. There are about 400 faded trees scattered throughout Willow Creek; however, biological evaluations made this fall show evidence of decreasing tendencies. Much of the fading in the Willow Creek drainage is attributed to comandra rust and damage by porcupines.

The number of faded lodgepole pine showing in Fall Creek has increased since 1961. Last year, aerial observers reported 200 faded trees, but no infested trees were found during ground examinations in spite of an abundance of "red tops." The majority of this infested area is Douglas-fir type with little suitable lodgepole pine host material. No ground inspection was made this fall.

On state and private land around Kismet Peak, aerial detection surveys show 17,500 lodgepole pine were killed in 1961 by the mountain pine beetle on approximately 8,000 acres. This is an average of 2.1 trees per acre. These trees appear in groups of five to twenty-five trees. Aerial observers have reported fading here becoming more noticeable yearly since 1960. This infestation may represent a serious threat to adjacent Teton National Forest stands. Initial evaluations of this area are scheduled for early spring, 1963.

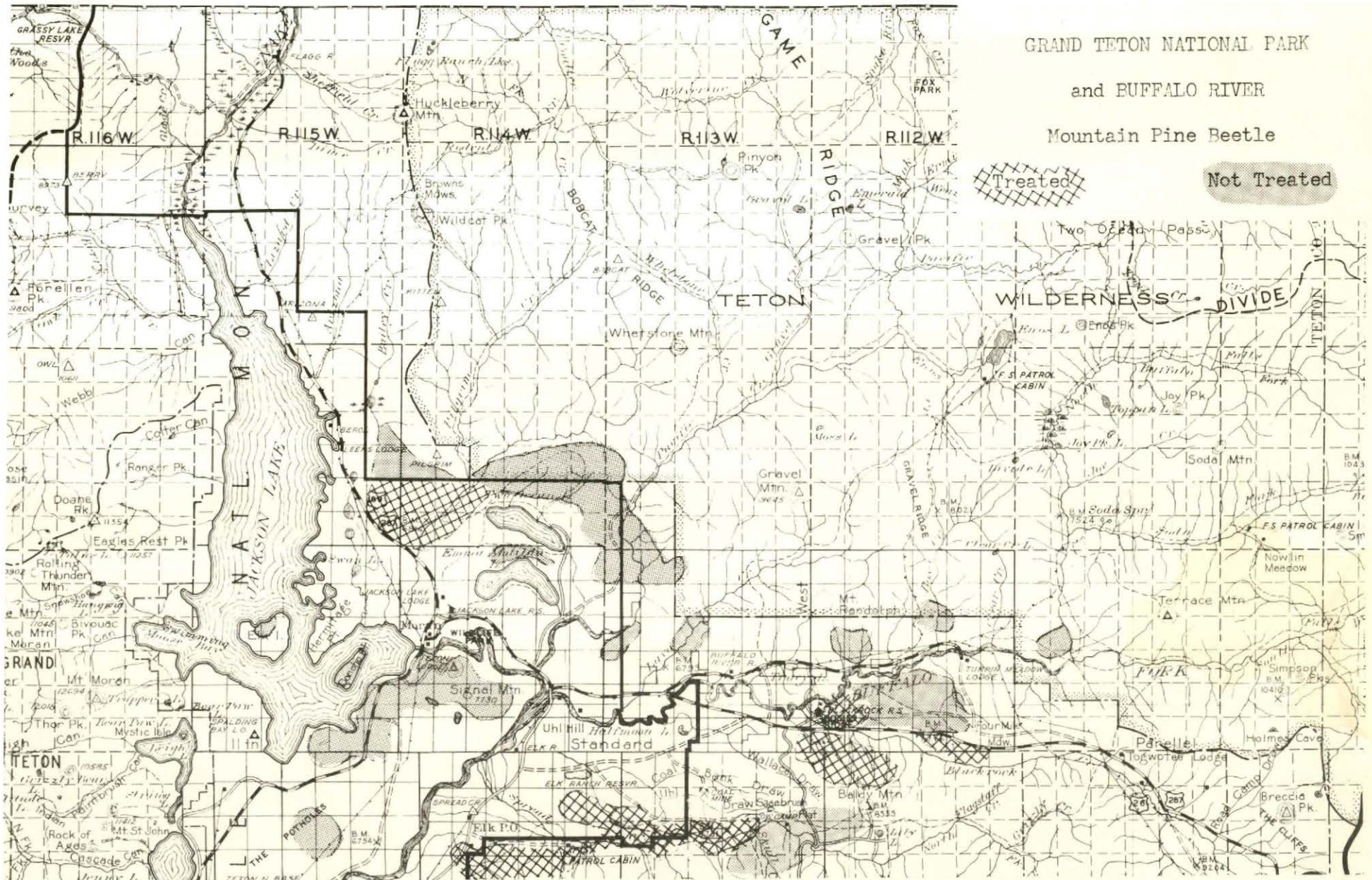
GRAND TETON NATIONAL PARK

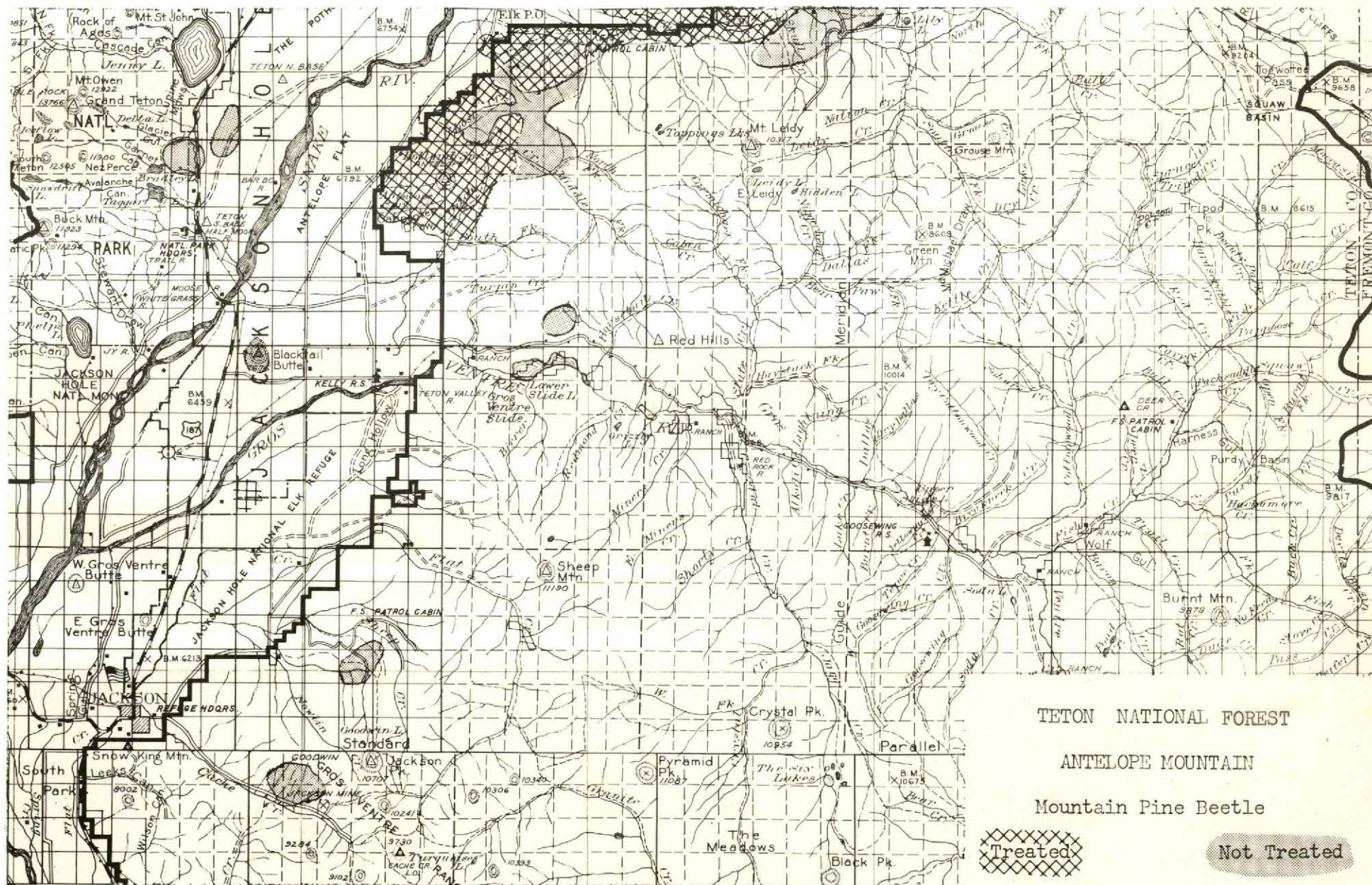
and BUFFALO RIVER

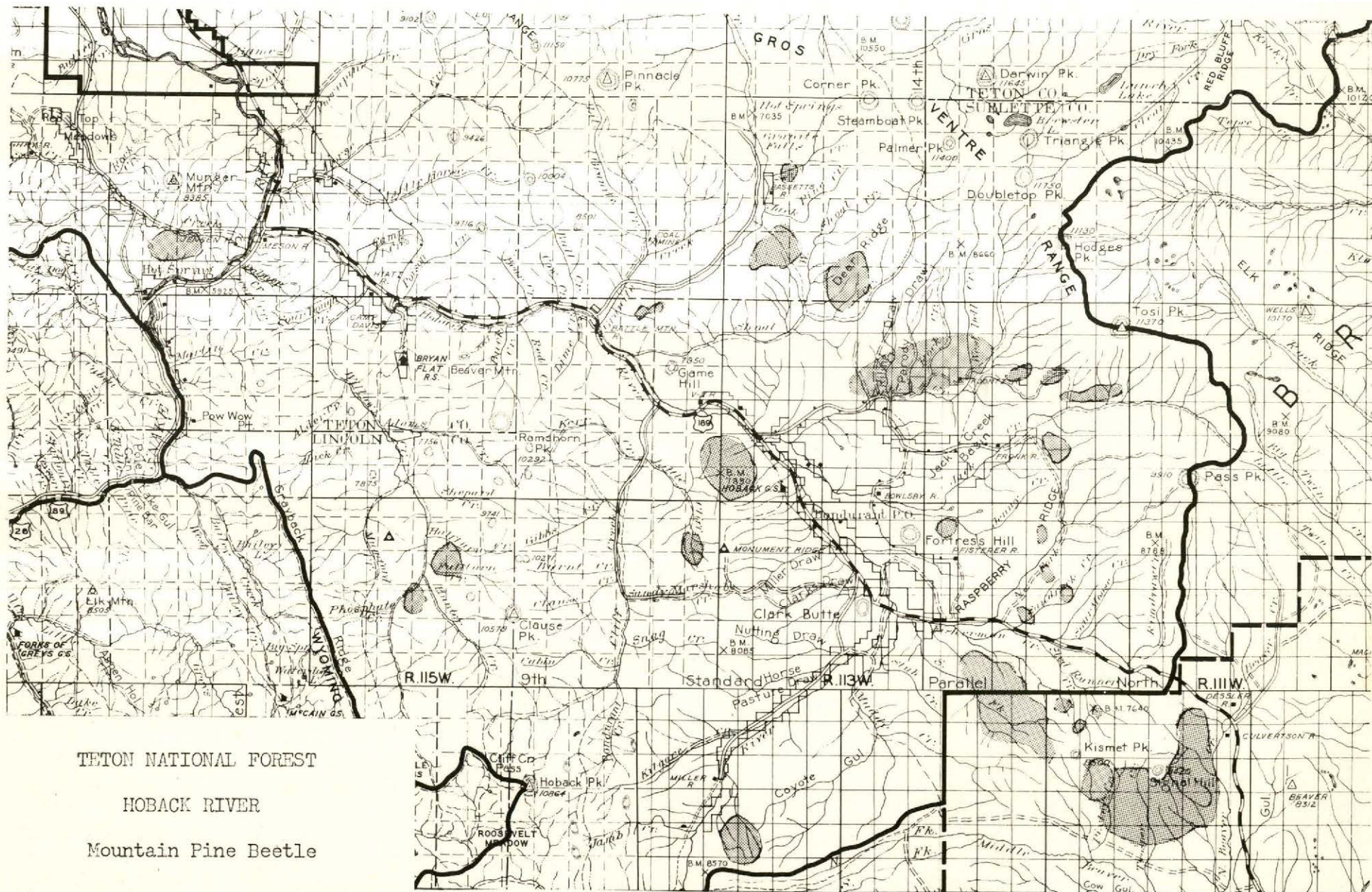
Mountain Pine Beetle

Treated

Not Treated







TETON NATIONAL FOREST

HOBACK RIVER

Mountain Pine Beetle

Nov 1962

Targhee National Forest

Infestations of mountain pine beetle persist at epidemic levels on the Targhee National Forest and adjoining state and private lands in eastern Idaho. During 1961, evaluators estimated approximately 55,000 infested trees were present on the Targhee National Forest. Over 20,000 trees were chemically treated in 1962 control operations. An aggressive logging program was initiated, and over one million board feet of infested timber was logged in Graham Hollow on National Forest land and from state and private land adjacent to the Moody Creek infestation. In addition, 400,000 board feet of timber were cut in the Taylor Creek infestation.

Operational surveys this fall found over 93,000 newly attacked trees. Epidemic infestations are strung along the northern end of the Forest from Kilgore to Island Park. Many scattered "hot spots" occur east of Teton. The largest infestation is east of Rexburg, Idaho, in and adjacent to Moody Creek. Operational surveys estimate over 37,000 newly attacked lodgepole pines in the Moody Creek epidemic.

Epidemic centers in Shotgun Valley and Antelope Flats contain approximately 11,200 trees on 1,900 acres. The Elk Wallow infestation continues to spread. Operational surveys this fall estimated 19,200 newly attacked lodgepole pine trees in that area. In 1960-61, Badger and Leigh Creeks contained small, "spot" infestations with thirty to one hundred trees per group. There are now over 4,500 newly attacked trees within these areas. Of the areas which were ground checked this fall, biological evaluations show brood densities epidemic, averaging over 230.0 per square foot. The buildup ratios averaged three newly attacked trees for every "red top." Overwintering brood mortality did not significantly reduce the existing populations. Ground evaluations indicate no downward trend of the beetle population within any of the epidemic centers. From all indications, strong epidemic tendencies will persist for at least one more year on and adjacent to the Targhee National Forest. If these infestations continue to increase at the rate of the past two years, major losses of mature lodgepole in and adjacent to infestation centers can be expected.

To combat the mountain pine beetle, the Targhee National Forest has continued and expanded an aggressive sales program within the infestation boundaries. Briefly, the progress of the program is as follows:

<u>Sale Area</u>	<u>Volume</u> (bd.ft.)	<u>Remarks</u>
<u>Moody Creek Infestation (30 to 50% infested)</u>		
Graham Hollow	1,000,000	Cutting completed June 1962.
South Moody	435,000	Cutting should be complete December 1962.
Sheep Creek	550,000	Sold and cut October 1962.
Mud Springs	1,600,000	Cutting started, to be finished before spring.
Canyon Creek	2,090,000	To be sold November 21, logged before June 30, 1963.
Graham Hollow(State of Idaho)	6,000,000	Cutting probably will be complete before June 30, 1963

Elk Wallow Infestation

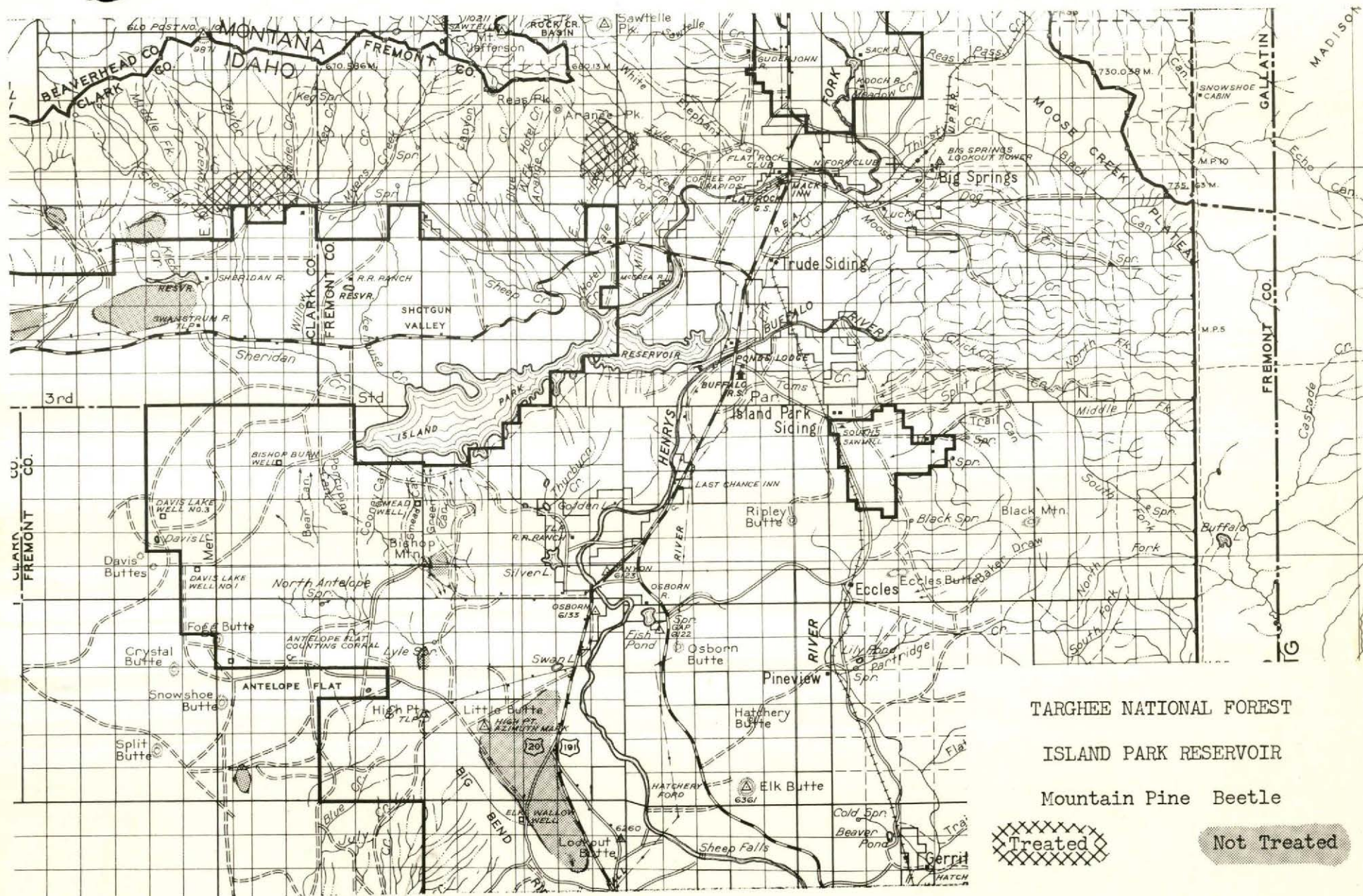
Elk Wallow	6,900,000	Sold November 5 (2 year sale) Cutting to start next spring.
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Shot Gun Valley Infestation

Taylor Creek	400,000	Logging completed Nov. 1961.
Taylor Creek	2,040,000	Bids open November 20, 1962. Cutting may not start before June 1963.

Volumes sold or advertised by the Targhee National Forest since beetle flight in the fall of 1961 total 15,015,000 board feet. In addition, the State of Idaho has sold 6,000,000 board feet. Altogether, over ten and one-half million board feet will be logged before the present generation of mountain pine beetle flies next summer. From the entomological viewpoint, these sales are accomplishing two important objectives: reduction of the bark beetle population, and removal of susceptible host material.

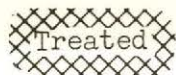
Bush!



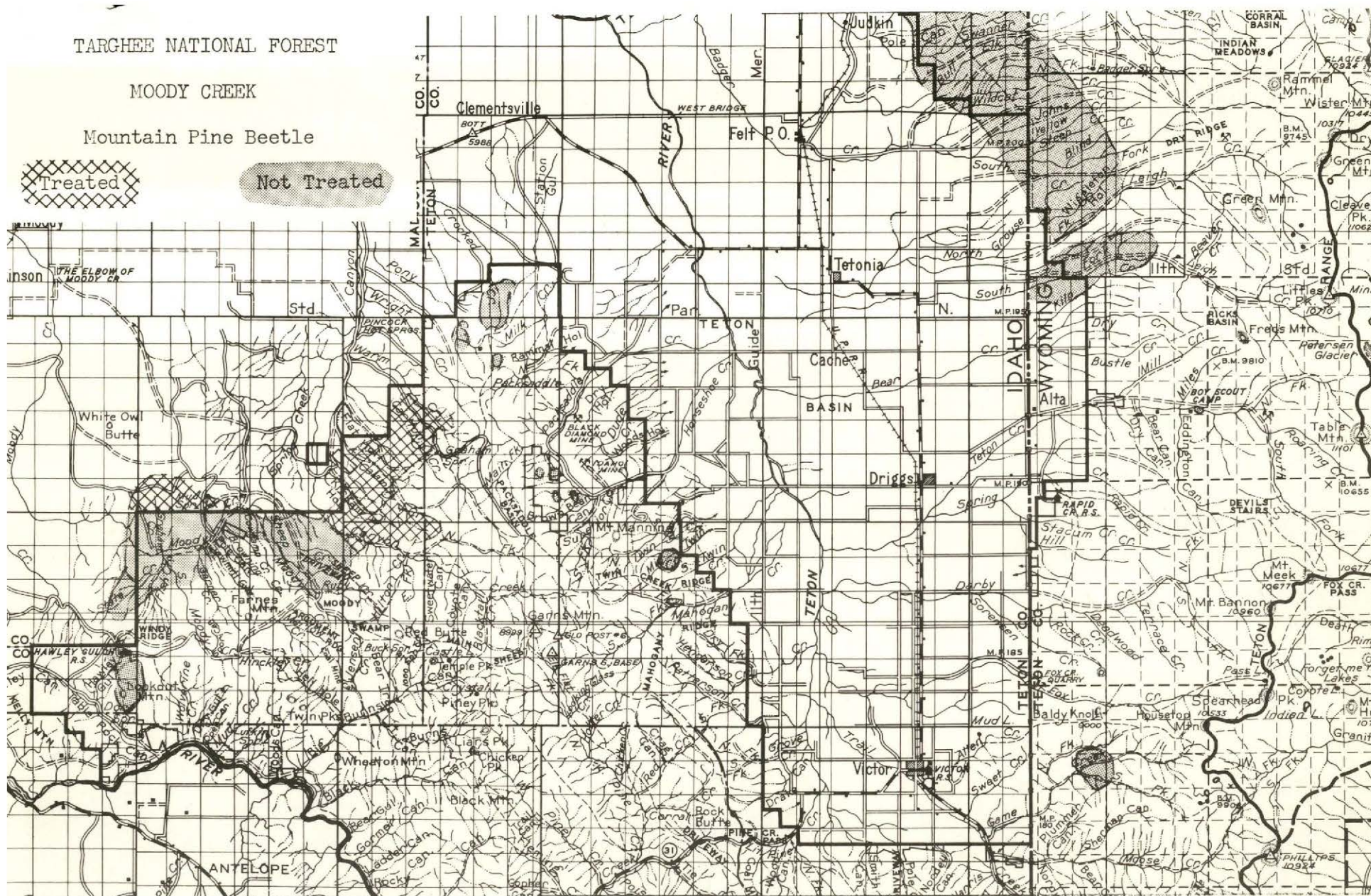
TARGHEE NATIONAL FOREST

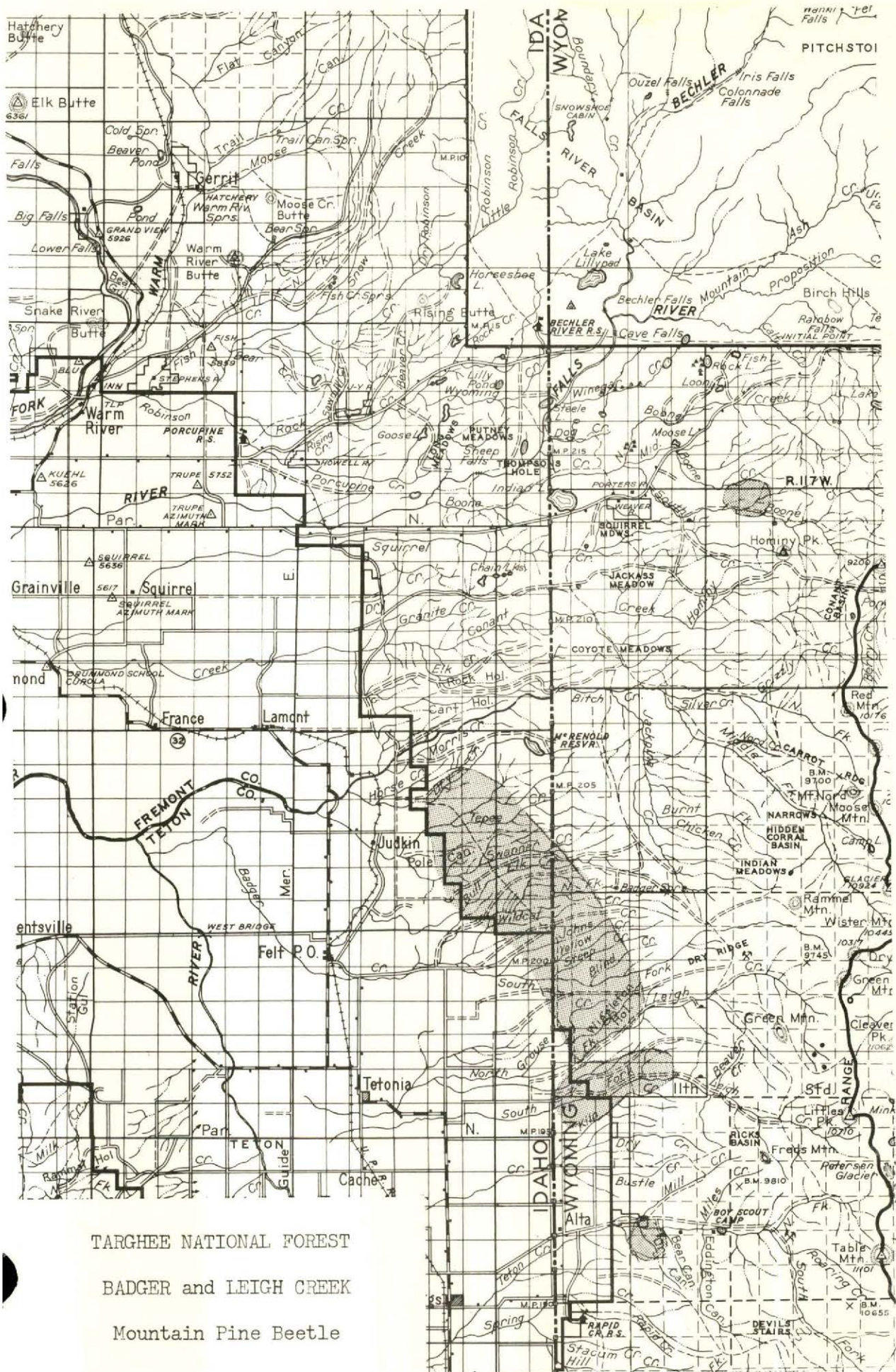
MOODY CREEK

Mountain Pine Beetle



Not Treated





TARGHEE NATIONAL FOREST
 BADGER and LEIGH CREEK
 Mountain Pine Beetle

Payette National Forest

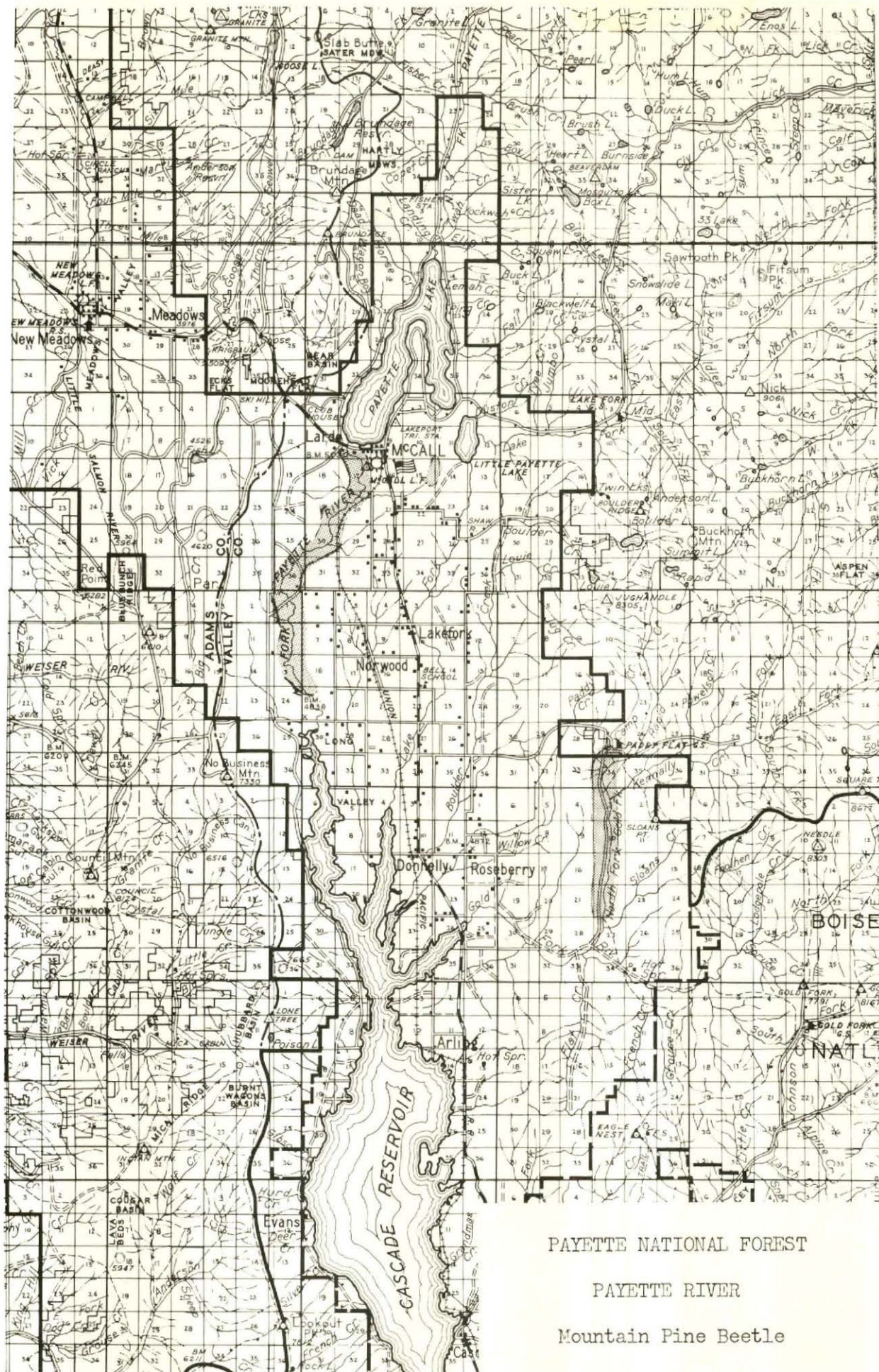
A mountain pine beetle outbreak has been active in lodgepole pine along the North Fork of the Payette River since 1961. Infested stands extended from McCall, Idaho, for approximately seven miles on both sides of the river to the Cascade Reservoir primarily on state and private lands. Occasional second-growth ponderosa pine trees are being attacked.

Since 1961, several biological evaluations have been made of the infested areas. Data from evaluations show the diameter of attacked trees did not differ from 1961 to 1962. Brood densities did not vary significantly in different size trees, but there were "hot spots" within the infestation with heavier brood densities. During the past year, mortality to overwintering brood was over 70.0 percent. This mortality possibly resulted from cold air pockets in parts of the infested stand. Although there was considerable mortality to broods during the winter, in general it was not above the normal expected and did not reduce the potential destructiveness of the pest. There is little difference in number of attacks per square foot of infested bark from 1961 to 1962. Evaluations show that although the number of attacks per square foot did not differ greatly in the two years, adults produced more inches of parent gallery and more brood this fall.

The average fall brood density is 269.0 per square foot of infested bark. The infestation is classed as epidemic, and there is no indication of a downward trend.

Because of the potential seriousness of this infestation and the likelihood of adjacent stands of lodgepole and second-growth ponderosa pine becoming infested, an operational survey was conducted which showed over 18,000 lodgepole pine trees now infested. This is a fourfold increase over last year.

Payette National Forest personnel reported fading in lodgepole pine stands on National Forest, state, and private land around Paddy Flat Ranger Station in the North Fork of Gold Creek. This infestation extends southward from the Ranger Station. Operational surveys estimate 2,600 newly attacked lodgepole pine trees in the Paddy Flat infestation. Brood densities average 197.0 per square foot. This, in itself, would normally indicate a potentially serious situation. Entomological appraisals, however, are not dependent on single factor analysis; and other infestation characteristics were examined which qualified the appraisal. At the present time, the number of newly attacked trees is only about one-half what it was in 1961. For every new, faded tree two old, "red topped" trees were observed. Attacks this year were confined primarily to small groups, and no widespread infestation pattern has developed. Considering all of these factors, the present infestation is classed as static or only slightly increasing. The infested areas will be kept under surveillance to detect any change in status.



PAYETTE NATIONAL FOREST

PAYETTE RIVER

Mountain Pine Beetle

Boise National Forest

Several mountain pine beetle infestations are present on the Boise National Forest. Small groups of lodgepole and second-growth ponderosa pine have been killed.

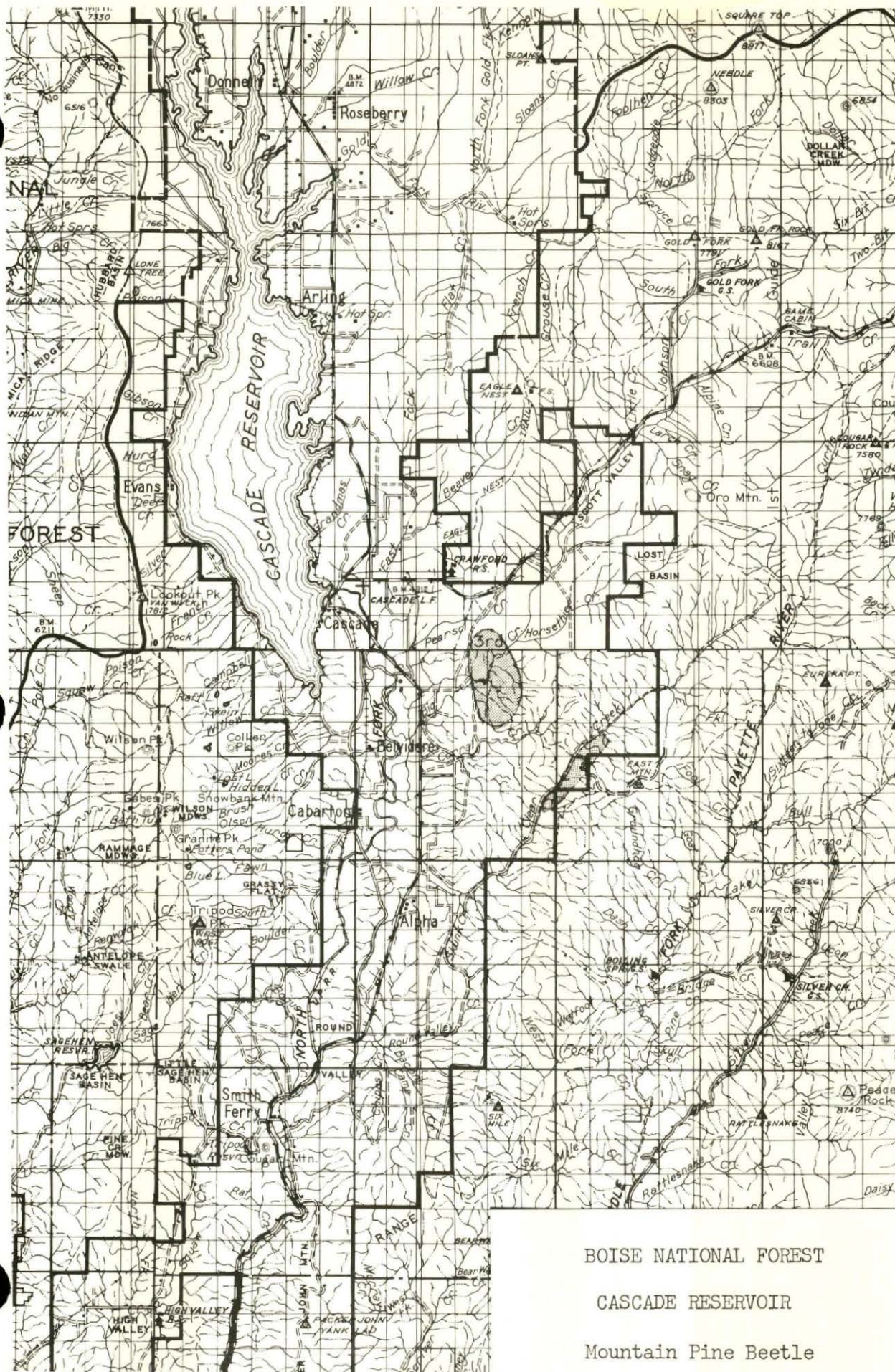
Aerial detection surveys show 300 lodgepole pine were killed by mountain pine beetle in Clear Creek in 1961. Ground evaluations this fall indicated an endemic situation. Attack density was light, averaging 5.8 per square foot of infested bark, and brood production averaged only 153.0 per square foot. Infested trees are rather scarce and widely scattered.

A mountain pine beetle infestation is active in Big Creek on state and private lands bordering the Boise National Forest. Approximately 500 second-growth ponderosa pine are estimated to be infested. This infestation is characteristically epidemic and will probably continue to increase in severity. Attack and brood densities average 8.0 and 184.0 per square foot, respectively. The average size of this stand is 8-inch d.b.h.

There are other small, spot infestations on the Boise National Forest, but it was not possible to make ground investigations and biological evaluations this fall. None are considered serious at this time; however, ground evaluations will be scheduled next spring to appraise their potentials more accurately.

Cascade, Idaho

Aerial detection survey personnel this fall located what appeared to be an Ips infestation in second-growth ponderosa pine southeast of Cascade, Idaho. Most, if not all, of the infestation is on state and private land. Entomologists ground checked the area and found that mountain pine beetle was causing the major portion of the damage. Mountain pine beetle brood densities averaged 184.8 per square foot of bark area at breast height. Ips were present in the infested trees but apparently as secondary pests. Only about 20 percent of the brood consisted of Ips larvae. Average size of infested trees was 8-inches d.b.h. Rough estimates by the evaluators indicate about 1,000 currently infested trees on a 1,500 to 2,000 acre area. A buildup ratio of about 3 : 1 occurred this year. This new center of infestation is definitely of epidemic status and is expected to build up rapidly from the scattered groups of currently infested trees.



BOISE NATIONAL FOREST

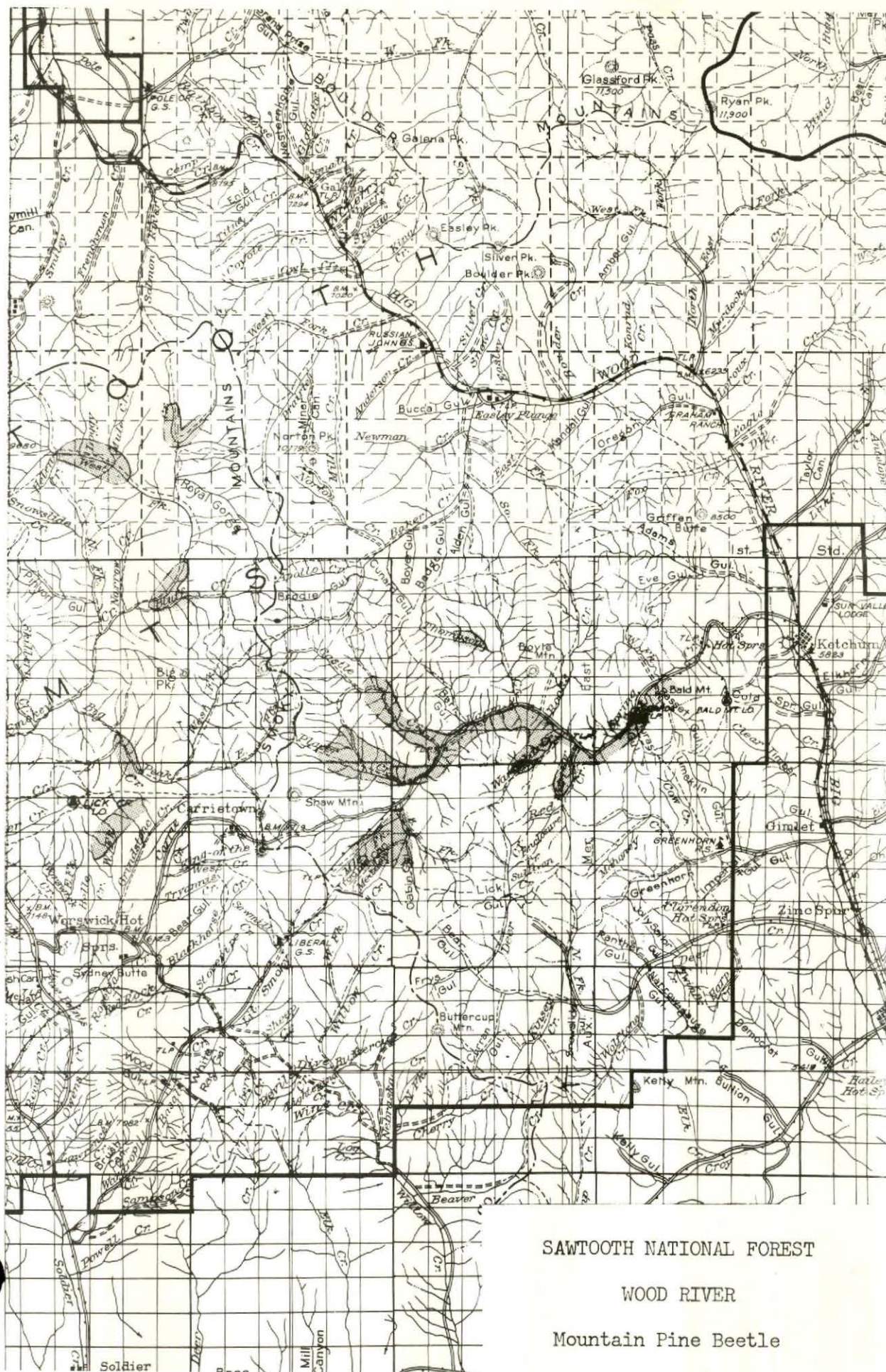
CASCADE RESERVOIR

Mountain Pine Beetle

Sawtooth National Forest

On the Sawtooth National Forest aerial detection surveys show 2,500 lodgepole pine trees have been killed by mountain pine beetle during 1961. Infestations occur in small scattered groups. The largest number of infested trees are in the Warm Spring drainage west of Ketchum, Idaho.

Ground investigations were made by entomologists and Forest Service personnel this spring. The trees show heavy woodpecker work, and brood densities are at a relatively low level. It is doubtful if any increase in number of infested trees will occur. In all probability brood populations will continue to decline.



SAWTOOTH NATIONAL FOREST

WOOD RIVER

Mountain Pine Beetle

Caribou National Forest

Mountain pine beetle activity in lodgepole pine has increased on the Caribou National Forest this year. Fall aerial detection surveys located several new infestations and extensions of old attack centers. It is estimated that 1,500 to 2,000 trees were attacked on this Forest in 1961. Areas where fading was observed from the air during the 1962 flights are: Diamond Flat, Robinson Creek, Tincup Creek, Eagle Creek, and Pritchard Creek. Only a few of these areas have been ground checked, and severity and trend information remain mostly unconfirmed.

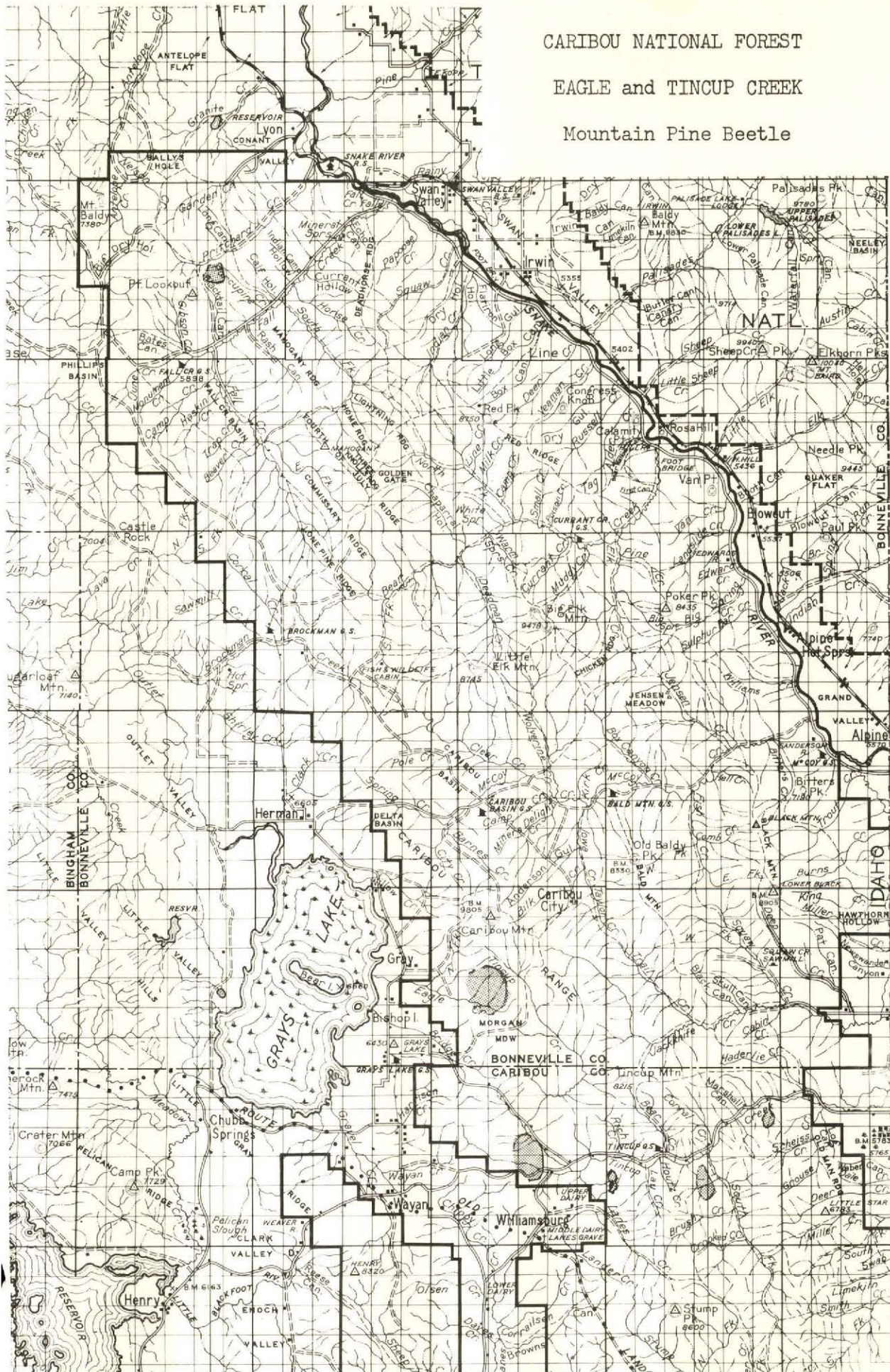
Last year an epidemic infestation was reported in Clear Creek. Brood densities in the fall of 1961 averaged 207.4 per square foot of bark area at breast height. Overwinter mortality reduced the brood 36 percent. Surviving brood populations averaged 132.4 per square foot of bark area. This parallels spring brood densities of other epidemics in the Region and indicates a definite increasing tendency.

Examinations of all areas are scheduled for next spring.

CARIBOU NATIONAL FOREST

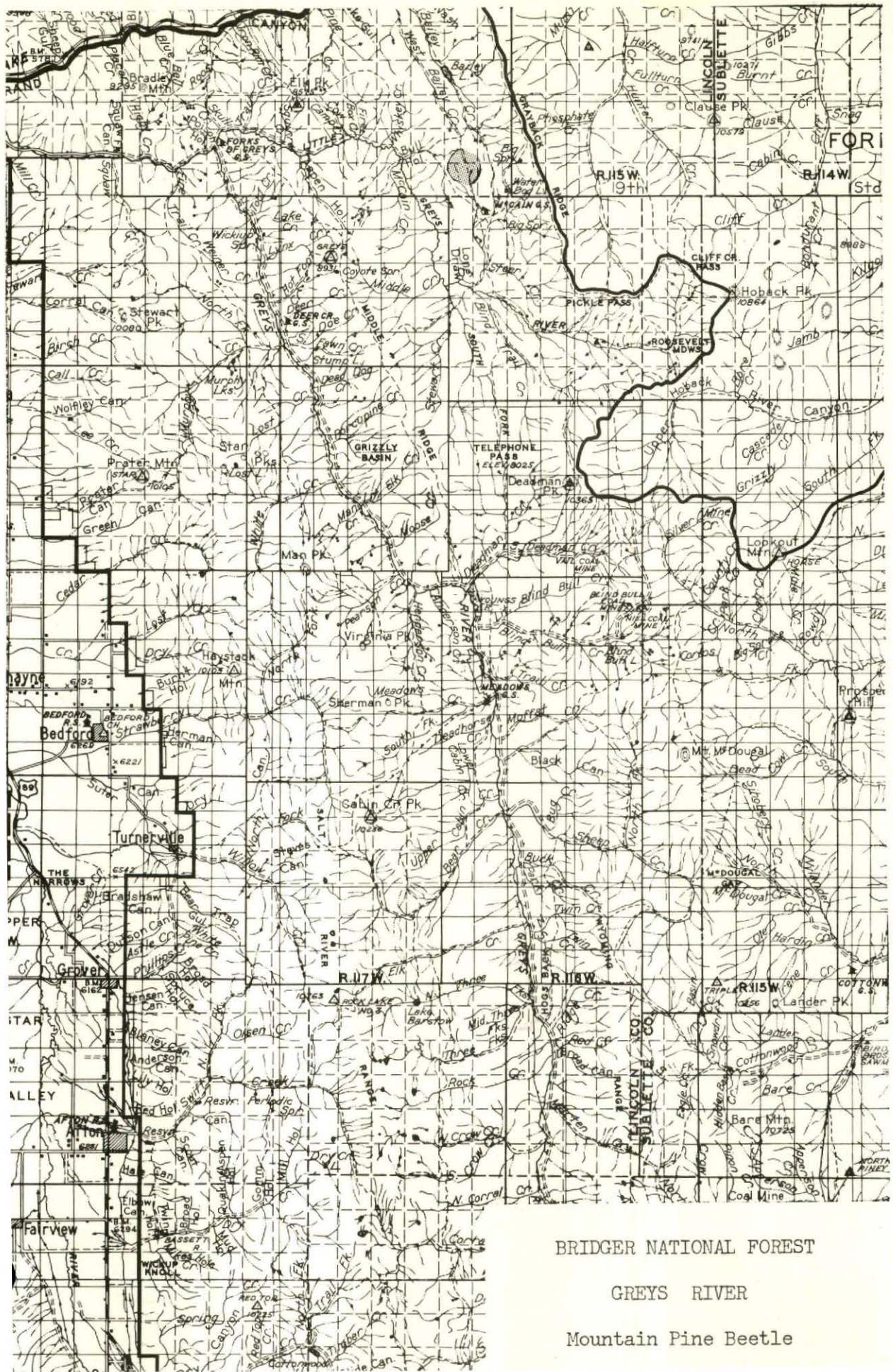
EAGLE and TINCUP CREEK

Mountain Pine Beetle



Bridger National Forest

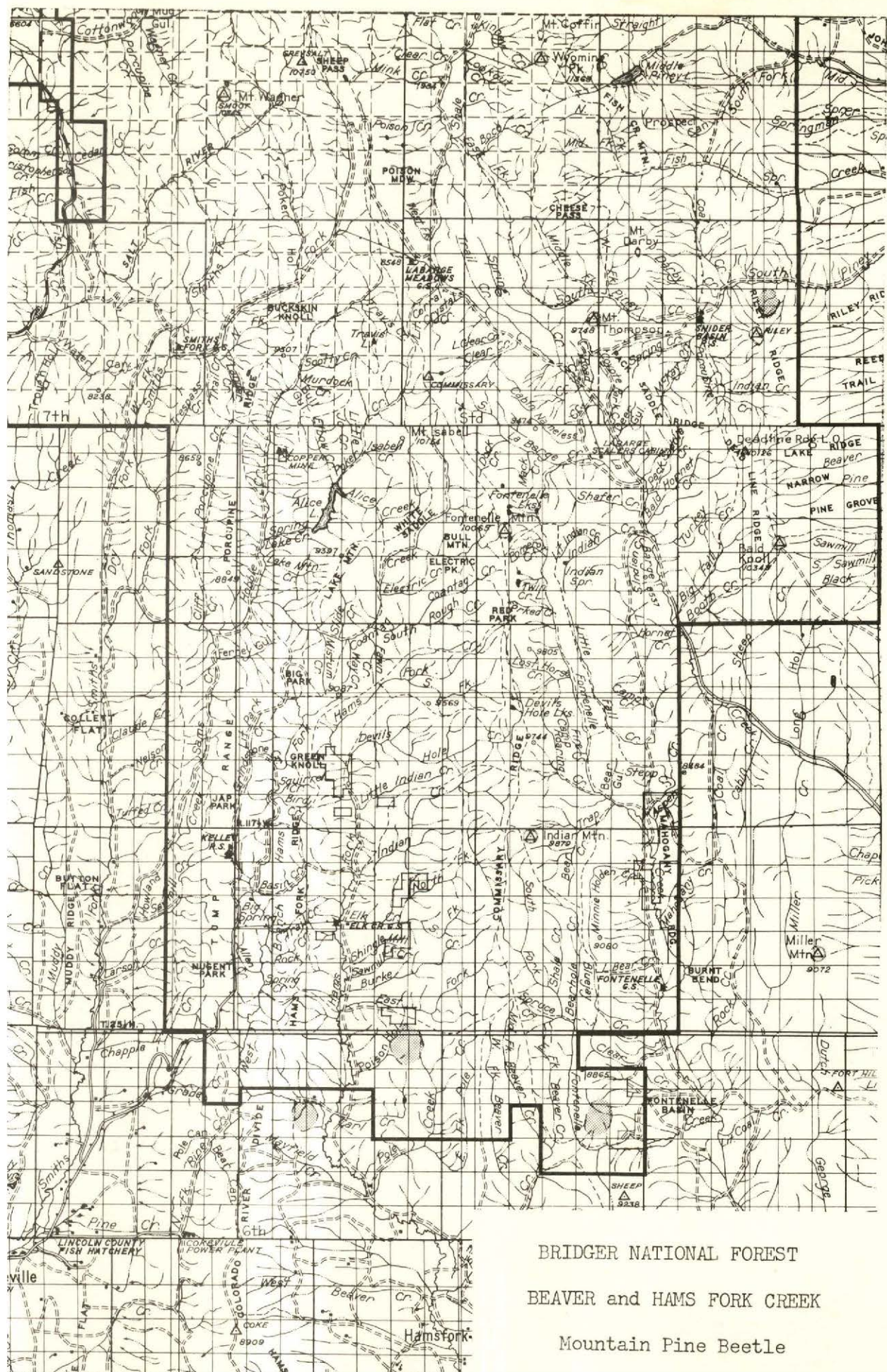
Mountain pine beetle activity was detected during fall surveys in the following areas on the Bridger National Forest: South Piney Creek, West Bailey Creek, Snider Basin, Cottonwood Creek, Poison Hollow on the Wyoming Division, and in Mayfield Creek on state and private land. On the Bridger Division, there are mountain pine beetle infestations one mile north of Willow Lake, one-half mile southeast of Willow Creek Guard Station, one on the south side of New Fork Lakes and about 300 "faders" in Little Greys River. In 1961, aerial detection surveys crews reported 10 to 50 infested trees in each of these areas. This year, there are approximately 600 "faders" in all of these infestations. Infested trees do not occur in groups, nor is the buildup characteristically "explosive." It has not been possible to ground check and biologically evaluate these infested areas. None appear to be serious.



BRIDGER NATIONAL FOREST

GREYS RIVER

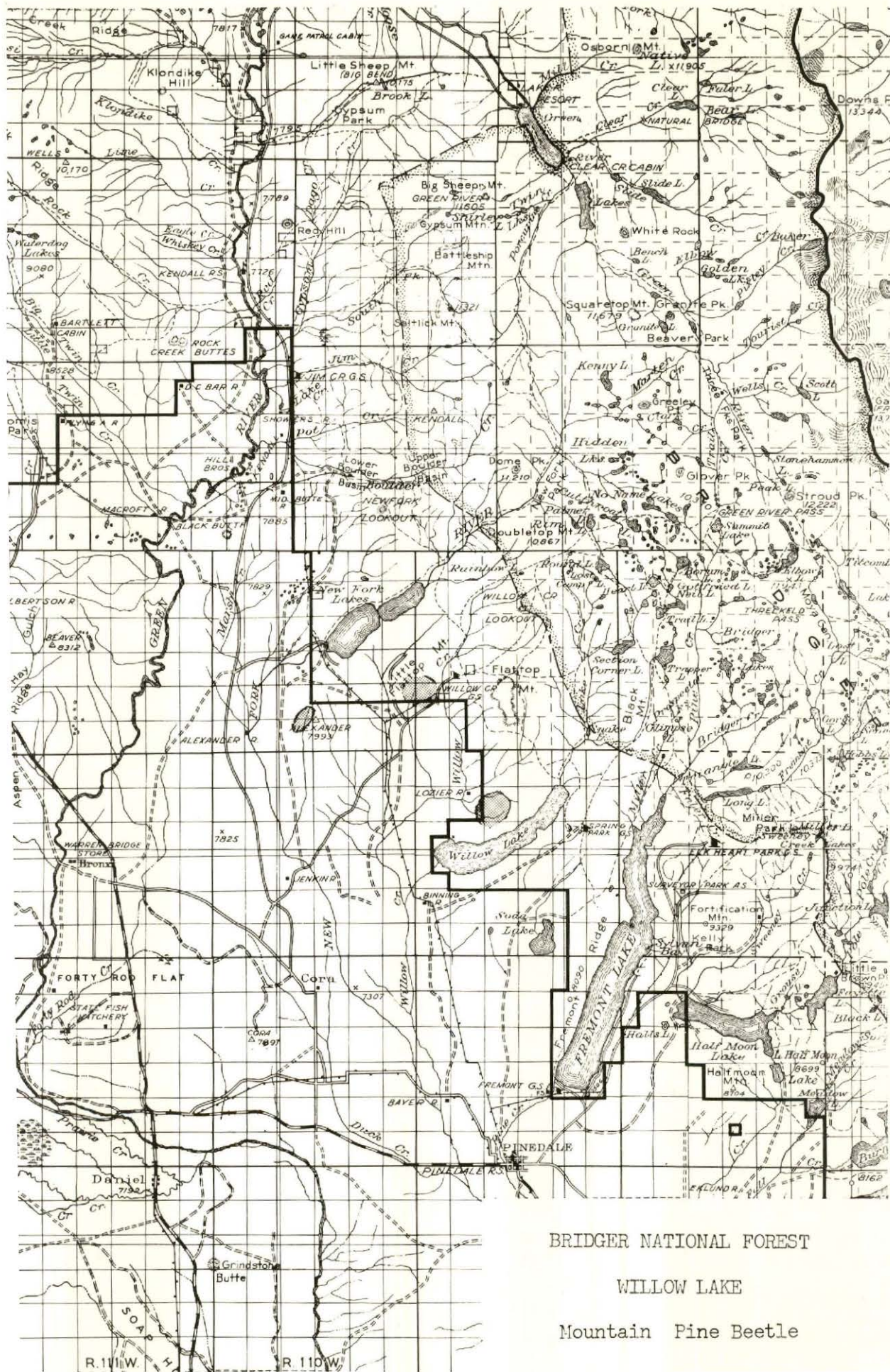
Mountain Pine Beetle



BRIDGER NATIONAL FOREST

BEAVER and HAMS FORK CREEK

Mountain Pine Beetle



BRIDGER NATIONAL FOREST

WILLOW LAKE

Mountain Pine Beetle

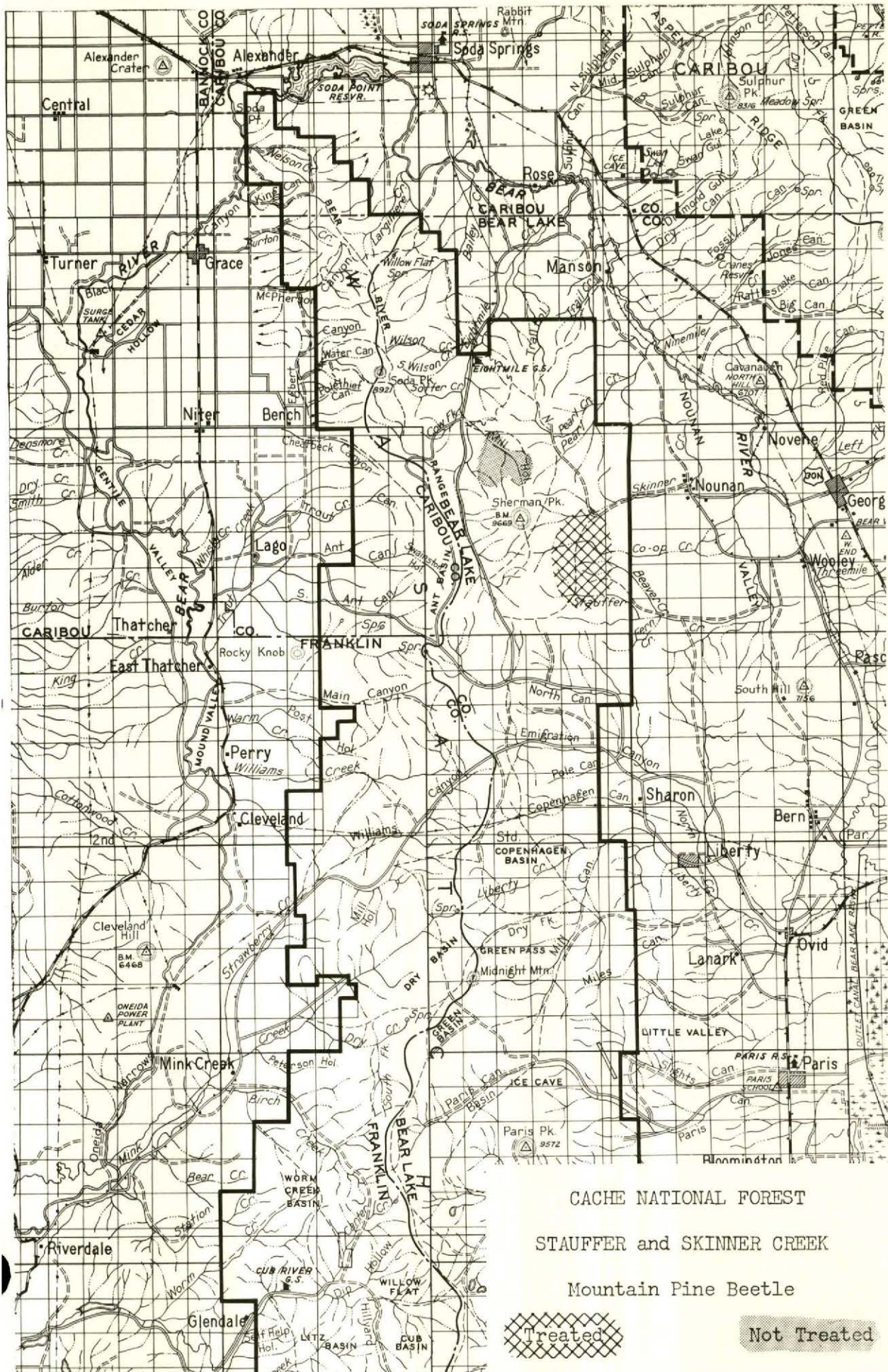
Cache National Forest

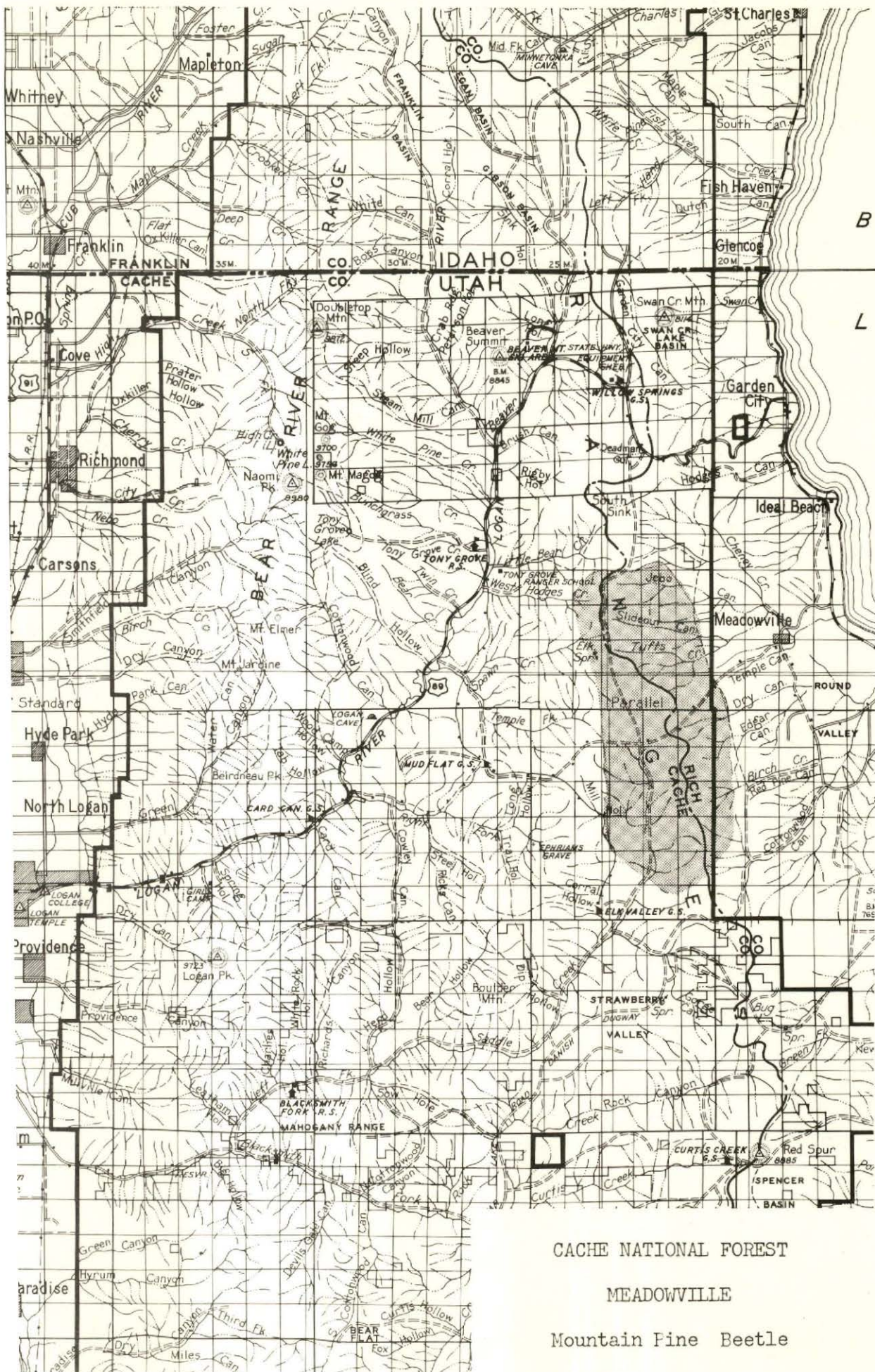
Epidemic centers of mountain pine beetle in lodgepole pine have increased this year on the Cache National Forest.

Last year in Stauffer Creek, limited control was undertaken and 275 infested lodgepole were chemically treated or burned.

Other infestations have been recorded in Rock Creek, Cottonwood-Dry Canyon, White Pine Creek, Lime Kiln Creek, Copenhagen Basin, Skinner-Coop, Trail Canyon, and Mill Hollow. There are scattered groups of infested trees throughout the Eight-Mile Creek drainage. Aerial survey personnel estimate a total of 7,000 "faders." None of these infestations have been ground checked, but nearly all show an increase in number of "red tops" over last year.

Probably the most serious increase since last year has occurred in the Cottonwood-Dry Canyon area. Infested trees occur in groups of five to ten trees per group. Spring evaluation estimates listed 4,000 to 5,000 infested lodgepole pine trees on approximately 4,000 acres. Biological evaluations of all infestation centers on the Cache National Forest will be made next spring.





CACHE NATIONAL FOREST

MEADOWVILLE

Mountain Pine Beetle

DISCUSSION

Mountain Pine Beetle

Of the forty or more known epidemic infestations of mountain pine beetle in the Intermountain area, some have been active for more than fourteen years, but many have developed within the last one or two years. The North Slope infestation on the Wasatch National Forest is the oldest in the Region. Elsewhere, epidemic infestations developed in 1956 on the Teton National Forest and were followed by infestations on Grand Teton National Park and the Targhee, Ashley, Cache, Caribou, Bridger, and Payette National Forests. Throughout the Region, on lands of all ownerships, there are now over 375,000 infested trees in epidemic centers. In addition, there are many thousands of infested trees in small groups scattered throughout the lodgepole pine type.

In this report an attempt has been made to predict the future course of each outbreak discussed. It should be understood that the prediction is for the beetle population which may or may not be reflected in the number of infested trees. To clarify by example: In a given situation the density of attacking parents may be twelve per given unit of area. An equal number of progeny may survive to the point of attack, but elect to attack two trees at a density of six each. Thus, the number of trees has increased, but brood population has remained constant from adult to adult. Conversely, the parent adult density may be six per given unit of area but produce progeny totaling twelve, a 2 : 1 increase. The survivors may choose to attack trees to a density of twelve which would result in a static number of infested trees. In some cases we have attempted to predict what will happen in the way of number of trees that will be infested. In most of these examples, we have collected data over several years that tend to reinforce the predictions.

Many factors work to influence the bark beetle populations within epidemic centers and the effect is reflected in population fluctuations. Interpretation of the fluctuations is one step in the evaluation of a given infestation. Comparisons of population levels between areas, while informative, rarely provide adequate evidence to make reliable predictions of population changes. To support this statement, we present the following: The fall 1961 brood density on the Wasatch North Slope Project area averaged 271 per square foot and was found to be fairly even throughout the infestation. Low winter and spring temperatures produced a varied effect on the brood. In April of 1962, there were two distinct levels of population density. On the other hand, the fall 1961 brood density on the Teton National Forest was stratified, with the older infestation having a brood averaging 280 per square foot while on the newer infestation the average was only 141 per square foot. By spring (April-May) brood densities in the two areas did not vary significantly. Still another situation is apparent upon review of Grand Teton National Park data. Here, the

fall 1961 brood density fell into two classes; but contrary to the Teton National Forest, the new infestation had the highest brood density. Brood reduction through winter varied; i.e., the high population area had a percent reduction less than half of that in the area having lighter populations. Thus, the area with the high brood density in the fall contained the highest in the spring. Significantly, on all of the areas discussed (Wasatch-North Slope, Teton National Forest, Grand Teton National Park), there was an increase in the number of trees infested this fall. The number of attacking parent adults in the newly infested trees is sufficient to produce progeny densities strongly indicative of epidemic conditions.

Mortality of progeny is an important item in the evaluation of a given population. It is recognized as a normal and necessary phenomenon. Under epidemic conditions with increasing tendencies, bark beetle mortality from egg through to attacking adult usually averages more than 90 percent. The important consideration is the variation of mortality in place, kind, and amount and not the total mortality. If mortality removes the same number of individuals at all population levels, then the effect of small variations is independent of the amount of mortality during a particular stage, but is dependent upon the sequence in which mortality occurs. Small changes in mortality factors, acting early in the life cycle, are much more important than changes in those acting later.

Mortality from natural physical factors can cause brood reductions over widespread areas or in pockets, belts, or other patterns. If the limits of the affected areas are not clearly recognized, improper interpretation of the overall condition is likely to result. Reductions of populations through climatic changes are rarely permanent; they are more comparable to a year of treatment.

Unless mortality figures are tied to original populations and number of survivors, they may be misleading. To illustrate, if 90 percent of 10,000 individuals are killed, 1,000 survive; however, if the population is only 100 and the same percentage is killed, there will be only 10 survivors. It is essential to know the number of survivors necessary to maintain a given population. The likely number of progeny that will be produced by these survivors should also be considered. In other words, to accurately predict population trends of bark beetles, evaluations must be made of population densities; effect of mortality by stages on brood survival; and expected production in number of progeny from survivors.

Accurate, up-to-date information on outbreak conditions and reliable predictions of insect population trends can be extremely useful for the land manager conducting or planning a control project.

LODGEPOLE PINE AREAS

Forest Service Region 4

Mountain Pine Beetle Infestations
In Lodgepole Pine

